Equatorial Ocean must be affected through this strait, as the narrow and shallow Bering Strait cannot have any influence on this system of currents. No warm current forms there a 'thermometrical gateway' to the pole. The surplus of water annually added to the arctic sea must take its way through the strait between America and Europe. In its eastern portion, between Iceland and Norway, the warm current reaches to the comparatively shallow bottom of the sea (see Mohn's researches in *Petermann's mittheilungen*). North of the submarine elevation connecting Iceland and Norway, which nowhere exceeds four hundred fathoms in depth, the cold water of the arctic sea is dammed up: so the northern current has to pass the narrow Denmark Strait between Iceland and Greenland. Here we observe the immense ice-laden current following the coast of East Greenland. Through this strait the deep-sea motion towards the equator must take its way, as not a drop of cold water passes east of Iceland. The cold water rising at the equator can pass only this way. But, from the present state of our knowledge, we do not yet know whether the greater part is carried along by the deep-sea motion, or by the superficial current. The fact is, that the polar ocean is an immense Mediterranean Sea, with one outlet, through which the surplus of water has to find its exit: therefore the whole area near the outlet must be moved by strong currents; while the remote parts, the sea between the Parry archipelago and North Siberia, will only be affected by the prevailing winds. If there were no other reason, this would be sufficient to prove the impossibility of symmetrical currents around the poles.

As for Mr. Melville's meteorology, I confess that I cannot undertake to refute his theory at this place, as I should have to fall back on the elements of this science and those of physics. "And as they [the air-currents] *do* follow the earth's surface, they take their direction toward the pole, following the spherical surface of the earth until they reach the shoulders of the ellipsoid, where the flattening of the earth commences (!); then, having received their course and direction for a distance of nearly five thousand miles, they follow their *projected direction*, and continue on above the earth's surface just as much as the flattening of the earth at the poles amounts to." (!) I should be glad to learn the place where the earth begins to flatten! Mr. Melville's assertion that a low atmospheric pressure exists in high latitudes is not correct. The centres of low pressure are the Bering Sea and the North Atlantic Ocean around Iceland. Besides, regions of a low barometer are not those of calms, but of winds.

In short, Mr. Melville's theory cannot uphold itself, and a plan founded upon it cannot prove successful. We wish Mr. Melville might confine himself to the principle that every plan of advance towards the pole should be made according to former experiences, not vague theories. We hope he will succeed in reaching Franz Josef Land, and there, no doubt, he will find most interesting results; but we oppose the hazardous undertaking of leaving the land in order to reach the pole. From the experience he will gain in the far north, he may propound a new plan founded upon his own observations there.

We think the enthusiasm of Mr. Melville for arctic researches is highly to be praised. If any thing can encourage the public, it is the struggle of the arctic heroes for their noble task, the perseverance with which they brave the dangers of climate and ice, as well as the narrow-minded opponents who scorn their ideals. We hope Mr. Melville does not class us among these. We have the most hearty interest in polar exploration, and only wish Mr. Melville might save his life and his experience for an expedition not so hazardous and not so adventurous as the proposed one.

Dr. Franz Boas.

Did Cortez visit Palenque?

This interesting question, propounded by Professor Cyrus Thomas in *Science*, v. p. 172, should attract the attention of archeologists.

As there are some inaccuracies in his statements, and as, from a study of the documents in the case, I reach different conclusions, I beg to submit them to your readers.

The locality 'Titacat' was not reached *after* the execution of Cuauhtemoctsin (as Professor Thomas says), but was the station next previous to the one at which that event occurred; to wit, at Izancanac, the capital city of the province of Acalan.

As to this name 'Izancanac,' it is evidently in the Maya language, and means 'the residence of the chief of the Itzas,' who were a well-known Maya tribe. The province of Acalan is placed, on old maps, on the southern and eastern shores of the Bahia de Terminos; and, according to Cortez, its chief city was on or near the shores of this bay.

When at Zagoatespan, between which and Izancanac the only stations were Teutiaca and Tizatepelt, Cortez sent a messenger by sea to Acalan: hence both these places were on the seacoast, or near it. At Zagoatespan he was informed that there were two roads to Acalan, — one up the country; the other, shorter, near the seashore. He followed the latter, having to pass through extensive marshes, and to cross an arm of the sea (Estero, ô Ancon) over five hundred yards wide, and from four to six fathoms in depth. A day and a half's journey from this was Tizatepelt, the first town in the province of Acalan; and five leagues from it was Teutiaca, from which Izancanac was less than a day's journey.

This plain statement shows, beyond all question, that Cortez' route lay nowhere near Palenque, and that those who place it there cannot have traced it out according to his own notes in his celebrated 'fifth letter.' It was close to the seacoast, and quite far from those celebrated ruins.

As for his description of the temples of Teutiaca, he represents Izancanac as a much larger city, with more temples, and altogether a greater place (*muy grande y de muchas mezquitus*).

D. G. Brinton, M.D.

Mammalia in interglacial deposits.

May I be permitted to ask aid from some American contributor to *Science* who follows the lore of glacial geology? I learn that some American glacialists are satisfied that there have been two periods of glaciation, and I would inquire whether the interglacial deposits contain, like those of Switzerland, remains of mammalia, and, if so, what they are. Any reference to American evidence on these points would oblige

W. S. Symonds.

The Camp, Sunningdale, Eng., Feb 27.

Colored stars.

The planet Jupiter and the star Regulus (*a* Leonis) just now are so situated as to give us a fine example of a naked-eye colored double star, and strikingly illustrate the optical effect produced by two neighboring stars of very different magnitudes. The component colors, as they appear to the writer this even-

ing (March 11), are, Jupiter, yellow; Regulus, blue. The naked-eye view is very similar to the double star β Cygni, when seen with a power of about one hundred. Struve calls the color of Regulus bluish white; but its color now appears decidedly blue, or greenish blue. S.

Acquisition in infants.

I recently tried teaching Constance A., twelve months old, to ring a common dome table-bell. Perceiving the little knob on top to be somehow concerned, she fingered it clumsily, but could not learn to strike down on it accurately with her raised hand, though I forced her to do so many times. She made clumsy motions, but finally, half accidentally, she rang it. This was enough. She at once rang it repeatedly with great success. I took it away to test her memory, and the next morning she rang it immediately without suggestion, but had it for a moment only. She was then absent four days: on returning, she rang it at once. C.

Devonian strata in Montana.

The following note is written simply to place upon record the first positive identification of Devonian strata in the Rocky-Mountain region of Montana.

In 1872 the Hayden survey brought in, from several localities in the territory, collections of fossils, consisting mainly of separate valves of brachiopods embedded in a hard limestone. They were examined by Prof. F. B. Meek, who found that the species were mostly new, and that the genera represented were, without exception, common to both the carboniferous and Devonian, while a small proportion was also represented in the Silurian. In Hayden's sixth annual report, p. 432, Professor Meek says, "Some of the Producti, Chonetes, and Spirifer have rather a Devonian look, while a very finely striated Hemipronites is very similar to some of the Devonian types of that genus. Even the form I have referred to, H. crenistria, is quite as nearly like some varieties of H. chemungensis (Streptorhynchus chemungensis, of the fourth volume, Paleont. New York), from the Chemung and Hamilton groups of the New-York Devonian, as it is like the carboniferous forms of H. crenistria." However, notwithstanding the resemblance of the fossils to Devonian forms, he regarded the whole collection as belonging to the lower part of the carboniferous, as it contained no strictly Devonian types of corals, crinoids, or lamellibranchs. He at the same time stated his belief that they were referable to a lower horizon than the other carboniferous collections brought in from adjacent portions of Montana at the same time. The specimens examined by Professor Meek were mainly from the mountains on the south, east, and north sides of the Gallatin valley. During the summer of 1884, the writer, in company with Dr. F. V. Hayden, had occasion to revisit a portion of this area. In a section made at a point four or five miles north-west of Hamilton, running north-westwardly from the Gallatin River, a collection of fossils was obtained from beds which at the time were supposed to be of lower carboniferous age, and which were colored carboniferous on the geological map made in 1872. Upon returning from the field, the specimens were submitted to Mr. Charles D. Walcott of the geological survey, who identified them as undoubtedly Devonian. The following lists were prepared by him. List No. 2 includes some specimens obtained from a locality three or four miles north-east of the point from that where those in the first list were found.

Devonian fossils from north-east of Gallatin River, Montana.

LIST No. 1. — Discina lodensis Hall (?); Streptorhynchus chemungensis Conrad; Orthis Vanuxemi (?) Hall (?); Chonetes mucronata Hall; Productus lachrymosus, var. limus Conrad; Productus speciosus; Spirifera disjuncta Sowerby; Spirifera Engelmanni Meek; Rhynchonella pugna Martin; Rhynchonella sinuata Hall; Rhynchonella tethys Billings (?); Atrypa reticularis Linnarsson; Ambocoelia umbonata Conrad; Athyris hirsuta Hall; Athyris sp. (?); Aviculopecten; Grammysia, 3 sp.; Modiomorpha; Nucula; Schizodus.

LIST No. 2. — Streptorhynchus chemungensis Conrad; Spirifera sp. (?); Rhynchonella Horsfordii Hall (?); Athyris hirsuta Hall.

Mr. Walcott says, "Of the twenty-three species of fossils given in lists 1 and 2, twelve are identical with species occurring in the upper Devonian of the Eureka district, Nevada: of the others, two are upper Devonian species in New-York state, and Athyris hirsuta occurs at the base of the carboniferous, in the Eureka district. There is also a species of Athyris too imperfect for determination. The remaining forms are lamellibranchs belonging to five genera; and the species closely resemble those of the lower carboniferous, of the Eureka district." The latter were obtained from the upper portion of the bluff from which the specimens were obtained.

A. C. PEALE,
U. S. geological survey.

The Hall effect.

About a year ago Mr. Shelford Bidwell published a table intended to show that the direction of the magnetic rotation of the equipotential lines of an electric current in any given metal could be inferred from the sign of the effect produced by stress upon the thermo-electric property of the metal.

Although Mr. Bidwell's attempted explanation of the former effect by means of the latter has proved entirely inadequate, the table published is nevertheless interesting and suggestive. It appears, however, that the law indicated in this table is not perfectly general. Mr. Coggeshall and Mr. Stone of the present Harvard junior class, working with my co-operation at the Jefferson physical laboratory, find that French cold-rolled steel would form an exception in Mr. Bidwell's table, acting in the thermo-electric test like copper, but in the other test like iron. Their examination of copper and iron confirms Thomson's results with those metals, and, as a necessary consequence, Mr. Bidwell's table.

The students have examined only these three metals as yet, but will probably extend their investigation to others. E. H. HALL.

Cambridge, March 20.

P.S. — We have now taken a strip of aluminium, cut two pieces from it, and tested one of these pieces for the transverse effect, the other for the thermo-electric effect. The transverse effect is like that in copper. This agrees with the result of my previous examination of aluminium, but does not agree with the result obtained by Mr. Bidwell. The thermo-electric effect was like that in iron. This does agree with the result found by Mr. Bidwell. Hence this specimen of aluminium, which is not the same that I originally used, makes another exception in Mr. Bidwell's table. E. H. H.